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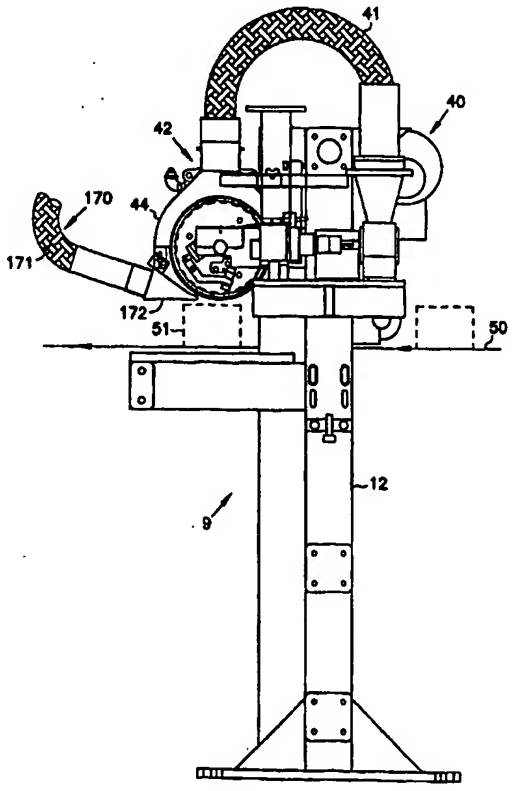
(54) Title: METHOD AND APPARATUS FOR HOT-MELT PRINTING

(57) Abstract

A rotary screen printing system is provided for printing hot melt dots and patterns on labels and various types of containers (51). A circular or cylindrical screen (10) is manufactured with the required pattern, and hot-melt material is delivered to the interior of the screen (10). Multiple patterns may be provided around the cylinder, depending on the size of the cylinder and the label for one container (51). A step action servo motor (20) coordinated with the advance of the product label or container (51) causes the screen (10) to contact the container (51) and rotate through the pattern, to screen the required pattern of dots on the surface of the container or label (51).



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METHOD AND APPARATUS FOR HOT-MELT PRINTING

Field of the Invention

The invention pertains to the field of printing by automatic printing equipment on packages and labels. In particular, the invention pertains to an improved method and apparatus for applying hot-melt material in numerous formations and patterns on various types of containers or labels for containers.

Background of the Prior Art

There is a need for packaged materials that are printed with a predetermined pattern of hot-melt material for adhesive or textured print purposes. In many instances, such packaged material or packages are moved through a process line on a conveyor type system. The packages are typically placed on the conveyor in a manner resulting in haphazard or random linear spacing between the packages. Because of the irregular spacing, accurately printing such a pattern in a particular location on each container or package is not possible without the use of intervening equipment to properly position each package.

There is also a need for packaged materials that are printed with a desired braille pattern to help people with poor or no eyesight to correctly identify packaged goods. Potential uses for these markings include flexible packaging, bottle, can, glass, carton, as well as frozen food packages. In addition, medical and pharmaceutical products may also need to be braille marked. The braille pattern may be printed on a label attached to the container or may be printed directly on the container itself.

To successfully meet this need, a manufacturing system for applying braille marking to packages must be relatively low in cost per unit, and easy to implement. It is also important that this system be adaptable to existing process lines, making printing possible while the production line is in operation. Most importantly, such system must be capable of accurately applying adhesive,

textured or printed patterns and creating durable braille dots and patterns that are not easily squashed or damaged during shipping and handling of the product.

Braille characters are made up of patterns of a basic dot format. Ideally, each dot consists of a uniform shape. This ideal dot, when viewed from the top, has a diameter of 1.4 mm. When viewed from the side, it has a height of 0.4 mm. It would be of a relatively uniform rounded shape.

Braille markings have been made in the past by press forming resin sheets onto a printed braille metal mold. This has the advantage of being a low cost process. However, when these packages are rubbed hard, or stacked for shipping, the tips of the braille dots can be damaged or squashed, which can impair the legibility and usefulness of the braille. For these reasons, this prior art process results in a low quality product.

Another prior art method which has been tried uses a hot-melt material for the dots, which is more durable than the resin material. This process consists of a hot-melt melter, pumping system, and multiple dispensing valves arranged to form patterns across the label. These multiple dispense valves can each dispense a drop of hot-melt material that approximates the shape of a dot. This has the potential of being a low cost process, but unfortunately it presented a series of problems.

One problem is in the shape of the dots themselves. The dispensed dot shape is not rounded on top, but has a tip, not unlike that of a familiar soft-serve ice cream cone, which can interfere with the braille reading process. Another problem is that it is difficult to configure enough valves close together, and make them all print a reliable, repeatable pattern. The size of the valves limits the number of characters and ultimate pattern size. The electronic patterning and registration of the valves that must be done to achieve a pattern is complex and costly, and ultimate speed is limited by the valve response. Additionally, reliability is a problem. The valves require a lot of maintenance to keep running, and a sticking or clogged valve will cause a misprint of the braille. Finally, installation, set up and maintenance of the system is time consuming and costly.

Summary of the Invention

To overcome these and other problems in the prior art, the present invention provides an improved method and apparatus for applying hot-melt material on labels or various types of containers to form braille legends, adhesive patterns, printed patterns and the like. By the use of a rotary screen printing approach, the advantages of hot-melt are achieved. Ease of set-up, high speed, low cost, pattern repeatability, and durable textured patterns and dots are achieved, leading to improved product quality. At the same time, the disadvantages of the prior art in terms of poor braille dot shape, poor reliability, high cost, and limitations of adhesive, textured and braille pattern size and uniformity are avoided.

The apparatus of the invention includes a conveyor system for moving a stream of product packages or labels. A rotary screen is disposed near the conveyor and includes a plurality of print openings which define at least one predetermined print pattern. The apparatus also has a system for delivering hot-melt material to the inside of the rotary screen. A sensing means on the apparatus determines when a package or label is about to pass adjacent the rotary screen and sends a signal to an electronic control system. The control system registers the next nearest print pattern to a print position, moves the screen into contact with the product or label, rotates the screen through the printing of the pattern on the product or label, and lifts the screen away from the product or label. The control system then repeats the cycle for the next subsequent product or label.

An advantage of the method of the invention is that the products or labels may approach the print screen in a randomly spaced manner and still receive an accurate and consistent print pattern. The control system matches the speed of the rotary screen to the conveyor system to produce a precisely shaped printed pattern on the product or label. The method also permits programmability of the control system to select from more than one of the same pattern or even different patterns on the print screen.

These and other features and advantages of the invention will become apparent from the following description of the preferred embodiment of the invention.

Brief Description of the Drawing

Figure 1 is a view in side elevation of a step action rotary screen apparatus constructed according to the present invention;

Figure 2 is a view in elevation from the rear side of the apparatus of Figure 1;

Figure 3 is a view in top elevation of the apparatus of Figure 1;

Figure 4 is a detail, at an enlarged scale, of the screen and die of the apparatus of Figure 1; and

Figure 5 is a view in side elevation of part of the apparatus of Figure 1 showing the screen stepping mechanism;

Figure 6 is an end view of a rotary print screen constructed according to one embodiment of the present invention; and

Figures 7 and 8 together are a schematic diagram of the control system for the apparatus of Figure 1.

Detailed Description of the Preferred Embodiment

Rotary screen printing machines have previously been developed by the assignee of the present invention, for printing hot-melt material on a continuous web of equally spaced label material, or a continuous or discontinuous stream of equally spaced conveyed products. In such machines, the printing cylinder is in the form of a screen which is manufactured producing openings forming the pattern to be printed. An example is in the delivery of an adhesive pattern to a web of material, such as zone coated label stock. A hot-melt handling system is provided for heating the material, and delivering it to the interior of the printing screen under pressure. A wiper on the interior of the screen forces some material through the openings of the pattern as the pattern is rotated relative to the wiper so as to screen the material on the web as the machine operates.

The stream of material to be printed includes a series of labels or other products which are equally spaced relative to one another. The rotary screen

process and the conveyor or web of continuous or discontinuous products therefore do not have to be continuously monitored or synchronized relative to one another.

The present invention builds upon this base of technology by providing a hot-melt screen apparatus uniquely adapted to screening of material onto labels, packages or containers moving along a conveyor type system. The apparatus thus developed provides for a step or incremental mode of operation, whereby the printing screen is rotated through an arc in contact with advancing packages, so as to print the desired braille dots. This is achieved through a step operation, synchronized with the advance of the next subsequent product.

Referring now to Figures 1 - 6, a hot-melt print apparatus 9 the screen 10 is positioned on a frame 12 for rotation by a shaft 28. A servo motor 20 applies power through a gear box 24, and coupling 26 to rotate the screen. Alternatively, various types of stepping motors could be used. A cylinder 30 such as an air or hydraulic cylinder or linear motor connects through a pivot arm assembly 34 to selectively raise and lower screen 10 from contact with the product, as explained herein below.

An air blower 40 provides a flow of air through a duct assembly 41 into a heater 42 and then through a screen heater hood 44 which generally surrounds the screen. A melter and pump system as is known from the Assignee's prior screen printing machines, which is generally shown herein as delivery system 150, provides the hot melt material under pressure to the die 15 in the interior of screen 10. As seen in Figure 6, print elements or openings are provided in the screen such as braille patterns 11a, 11b, 11c as shown. Other types of patterns may be provided for producing a desired textured pattern, an adhesive pattern or the like. The openings are provided in the screen through a manufacturing process such as etching, drilling, laser cutting, EDM (electro-discharge machining), electro-deposition, punching, or other suitable process according to the desired dot, texture or adhesive patterns intended for printing on the products.

Line 50 represents a conveyor system or path of the substrate 51, which could be a continuous web of labeled material, or a stream of flat cartons, bottles or other containers or packages. They are brought along a path generally tangent to the screen. In Figures 1 and 2, this would be tangent to the bottom of the screen 10 in the orientation shown. The products to be printed may be either regularly or irregularly spaced.

Figure 4 shows the screen 10 in greater detail, and also the die 15 which is internal to the screen. Die 15 is alternately pushed into contact with the interior of the screen, which is heated, to selectively force hot-melt from the interior of the screen drum through the pattern openings 11a, 11b, 11c and withdrawn from such contact at the end of a cycle to prevent hot-melt from going through the pattern openings. This selective contact of the die is controlled by die retract cylinder 16, which connects by its actuator shaft 17 to a pivot arm member 18 of the die. Die retract cylinder may also be an air or hydraulic cylinder or linear motor similar to cylinder 30.

The screen 10 may have the pattern openings for creating a particular print formation repeated a number of times around the circumference of the screen, depending upon the size of the print area and the number or size of patterns or pattern characters. The screen will be incremented a fraction of a turn on each application, according to number of patterns around the screen. The screen may alternatively include two or more distinct patterns, also being repeated a number of times around the screen, for printing two or distinct pattern formations.

In operation, the items to be printed will proceed along the conveyor system or path 50. As a product print side comes into position, as determined by the control system explained below, cylinder 30 (shown best in Figure 5) moves the print screen 10 down into contact with the object and, simultaneously, the servo motor 20 causes the screen to rotate, at the same peripheral speed as the object's linear speed moving past the printing area. In the case of rounded objects, such as the surface of a can or bottle, the target object is also rotating by the material transport or conveyor system 50 such that its circumferential speed

matches that of the print screen 10. Thus the pattern is rolled into place, the hot melt is screened or wiped through the pattern openings 11a, 11b, 11c by the contact of the internal die 15 placing the hot-melt print pattern on the product. Cylinder 30 then lifts the assembly out of contact, the die retracts, and the system is ready to repeat for the next subsequent product or label. A chill blast of cold air or a cooled surface contact may be required to have the hot-melt material set up rapidly.

The invention is described having a rotary screen which rotates on a horizontal axis and prints on a horizontally oriented surface of a package, container or label. As will be evident to those skilled in the art, the rotary screen may be oriented such that it prints on a surface which is vertically oriented as well as oriented on an angle. Such an apparatus would merely require a system for preventing hot-melt material from flowing down the screen and gathering adjacent the lower portion of the vertical or angled print surface. A collection system could be utilized to collect and return excess hot-melt material and return it to the delivery system or to the upper portion of the print surface. Alternatively, the delivery system and hot-melt characteristics may be manipulated to control and deliver only enough material as needed to prevent flow of excess material to the lower portion of the print surface.

As illustrated in Figure 1, a hot air knife assembly 170 may be incorporated into the air supply apparatus including blower 40 and duct 41 to help separate the hot-melt material between the freshly printed pattern and the rotary screen. The air knife assembly 170 has a duct 171 which, although not shown in the Figures, is routed to receive air from blower 40 and duct 41. The air knife may include its own separate heater or may draw from heater 42. For example, a braille dot preferably has a smooth rounded contour. A problem known in the art as "angel hair phenomenon" is caused by a lack of immediate separation between the printed material and the material left on the screen. A thin strand of material stretches between the printed pattern and the screen and breaks off leaving a sharp tip on each print element such as an individual braille dot. The hot air knife 170 has a tapered nozzle 172 blows a low profile, high

velocity stream of air between the pattern and screen to immediately separate the printed material from the material on the screen. Increasing the screen rotation speed and selecting appropriate hot-melt material compositions (discussed below) may be utilized as alternative or additional methods of preventing angel hair.

Referring now to Figures 7 and 8, a typical control system for the process is shown. In addition to the mechanical and actuating components previously described, a solenoid valve 130 is provided for controlling cylinder 30, specifically to raise and lower it depending on the signals applied to the valve. This is controlled by electrical signals on a lead 131 from programmable logic controller (PLC) 100. PLC 100 also controls via lead 117, a solenoid valve 116 which controls the retraction of die cylinder 16. The servo motor 20, and its attendant pulse encoder 140, is controlled by a signal on lead 120 from controller 102.

A screen position photosensor 110 is positioned to detect registration target 111 disposed on the rotary screen 10 or on shaft 28, and communicates via lead 112 to the server servo controller 102. The machinery which leads the product through the path includes a pulse encoder or a tachometer 113 to provide a speed reference signal for the mechanism which advances the product down the line. Sensor 114 and its target registration mark 115 provided on the product serves an index signal to indicate when the product is in proper position with respect to the rotary screen. Again, this can be a photosensor as is generally known.

Programmable input device 104 can be provided for the operator to input data to set up a run. This would include specifics for the length of the pattern, number of patterns on the cylinder, index and dwell pulses, the start air cylinder activation and end air cylinder activation parameters. Alternatively, a computer 105 can be connected via path 106 as indicated, to download previously developed programs to controller 102 and PLC 100.

In operation, the signals indicating the lead position speed, and the proper start index registration for the product and screen, are used by the control system

to coordinate the cylinder 30 and servo motor 20, to screen the pattern on the product. A signal representing screen position will be fed into the PLC 100 by position sensor 110 sensing the registration target 111 which has a known position on the screen 10. Sensor 114 detects a registration mark which would be provided at a predetermined location on the container to be printed or may sense the container leading edge. The control system corrects for registration errors. Registration correction while the screen is in contact with the substrates would cause a print element to deviate from its intended shape and contour. For example, a single braille dot of a print pattern such as 11a, 11b or 11c would become elliptical shaped. To keep the print elements from deviating in shape and contour, the registration correction takes place during the indexing portion of the cycle.

The line speed of the screen and substrate should also be controlled to prevent the above deviation phenomenon. In many cases, it will be preferable that the line speed and rotary screen speed match to produce a symmetrical uniform print element. It may be desirable under some circumstances that the screen rotates at a higher or lower speed than the line speed to produce a desired print effect, but registration of the print pattern must still take place prior to the application of the pattern on the substrate.

Pulse encoder 140 is provided at some point on the drive for the screen 10, for example on the motor 20, to indicate index and pattern pulses. This is compared to the speed for the containers advancing past the screening stage which may be measured by the conventional electro-mechanical tachometer or pulse encoder 113 and communicated to the PLC 100 and controller 102. After proper registration indexing of the screen, the cylinder 30 lowers the screen to the substrate to cause printing a hot-melt material pattern on the container. The die then retracts and the screen lifts from the substrate for the next indexing part of the cycle, and the process is then repeated.

An additional feature may be incorporated in the apparatus of the invention. A photosensor 180 may be utilized to sense whether there are any packages or labels being conveyed to the rotary screen. If no products are

approaching the screen, photosensor 180 signals PLC 100 and controller 102 to shut down delivery of material and movement of the screen until necessary.

Unlike the prior art systems discussed above, the print element shape or braille dot shape and profile provided by this screening process is nearly ideal, in terms of uniform shape and durability. Also, the pattern is precisely controlled by the original fabrication of the screen. To aid in the formation of the shape and size of each print element, each print opening in the screen and the hot-melt, screen, and die temperatures should be accurately controlled. In one embodiment, a screen thickness in the range of .016 to .022 inch thick is preferable to produce a desired braille dot size and shape having a diameter of 1.4 mm and a height of 0.4 mm. As an example, a braille dot opening in the screen should be slightly larger than the desired braille dot diameter, wherein an opening diameter in the range of .060 to .090 inch is preferred to produce the particular braille dot noted above.

In addition, to further ensure a more uniform braille dot, the chemical composition of the hot-melt itself would be specially formulated. The hot-melt coating fluid must be one that will readily flow at application temperature when subjected to the shear forces when separating from the screen and, after application, swiftly increase in viscosity, becoming in turn non-flowable and solid. The controlled viscosity and flow properties are tailored by the use of additives, fillers, and/or chemical gellants to induce a high degree of thixotropy. In addition, the dots of fluid must very rapidly become non-tacky and adhere tightly to the substrate. The end result must be a tough material, able to withstand repeated handling of the packages.

The following types of hot-melt materials are preferred for producing a braille dot pattern. These include polyamides and polyesters, both of which have very short open times and good adhesion to a variety of substrates. In addition, a combination of ethylene-vinyl acetate copolymer with petroleum waxes and modified polyethylene would also be suitable. Controlled flow is made possible by the use of fumed silica, such as Cab-O-Sil M-5 or EH-5, and fillers, such as talc, calcium carbonate, carbon black, etc. Chemical additives, such as glycols,

or hydroxyl-functional polyethers serve to enhance the utility of the above-mentioned fillers. In addition, various photochemically reactive materials and resins are available that can be used with or without the above mentioned additives, or other additives, to produce the desired result.

For other applications, such as printing a desired textured pattern on a product or applying an adhesive to a product or label in a particular pattern, other hot-melt formulations may be used as will be evident to those skilled in the art. The present invention is not limited to the particular hot-melt formulations described herein for a braille dot character pattern.

As is apparent from the foregoing description, we have provided a new and effective method and apparatus for the printing of hot-melt material on labels and product containers, that is more accurate, simpler, and more efficient than the prior art methods and is well suited for use in printing braille dot patterns as well as other textured and adhesive patterns.

WHAT IS CLAIMED IS:

1. An apparatus for applying hot-melt material on product packages or labels, said apparatus comprising:

a conveyor system for moving a spaced apart stream of said product packages or labels;

a rotary screen disposed adjacent said conveyor system and having a plurality of openings therethrough defining at least one predetermined pattern;

a delivery system for providing said hot-melt material to the inside of said rotary screen;

sensing means for determining when a package or label is about to pass adjacent said rotary screen; and

a control system for moving said rotary screen into contact with said product or label, for rotating said rotary screen through the printing of the predetermined pattern on the surface of the product or label, for lifting said rotary screen away from said product or label, and for repeating the printing cycle for a next subsequent product or label.

2. The apparatus of claim 1 wherein said sensing means comprises a photosensor electrically connected to said control system, said photosensor being adapted to sense a registration target disposed on said products or labels and send a signal to said control system to coordinate movements of said rotary screen.

3. The apparatus of claim 1 wherein said control system comprises a programmable logic controller programmed to receive and send signals for coordinating movement of said rotary screen and delivery of said hot-melt material to said rotary screen.

4. The apparatus of claim 1 further comprising an air or hydraulic cylinder or linear motor electrically connected to said control system to coordinate

movement of said rotary screen into contact and away from a product or label according to signals received from said control system.

5. The apparatus of claim 1 further comprising a servo motor electrically connected to said control system for rotating said rotary screen to print said at least one predetermined pattern and to properly index said rotary screen such that said at least one predetermined pattern is accurately positioned on said products or labels.

6. The apparatus of claim 1 further comprising a screen position photosensor electrically connected to said control system for locating a registration index mark on said rotary screen and sending a signal to said control system representing a position for said index mark to coordinate movement of said rotary screen with movement of said products or labels.

7. The apparatus of claim 1 further comprising a pulse encoder or tachometer electrically connected to said control system for sensing rotational speed of said rotary screen and sending a signal to said control system to match rotational speed of said rotary screen to linear speed of said conveyor system.

8. The apparatus of claim 1 wherein said at least one predetermined pattern comprises a braille dot character pattern.

9. The apparatus of claim 8 wherein said plurality of openings in said rotary screen further comprise a plurality of said braille dot character patterns.

10. The apparatus of claim 9 wherein said plurality of braille dot character patterns further includes at least two distinct braille dot character patterns such that said apparatus is capable of selectively printing at least two distinct braille dot character patterns.

11. The apparatus of claim 8 wherein said rotary screen has a screen thickness in the range of about .016 to .022 inches.

12. The apparatus of claim 8 wherein said braille dot character pattern comprises a plurality of circular openings in said rotary screen, each of said openings having a diameter in the range of about .060 to about .090 inches.

13. The apparatus of claim 1 wherein said hot-melt delivery system comprises a retractable print die disposed inside said rotary screen for application of said hot-melt material through said at least one predetermined pattern to said products or labels.

14. The apparatus of claim 13 further comprising a die retract air or hydraulic cylinder or linear motor electrically connected to said control system for moving said retractable print die from an application position to a retracted position according to signals received from said control system.

15. The apparatus of claim 1 wherein said rotary screen rotates on a horizontal axis such that said at least one predetermined pattern is applied upon horizontally oriented packages or labels.

16. The apparatus of claim 1 further comprising a photosensor electrically connected to said control system for determining whether any products or labels are moving along said conveyor system and for sending a signal to said control system to shut said apparatus down when no products or labels are moving along said conveyor system.

17. A method of applying hot-melt material on product labels or packages moving spaced apart along a conveyor system, said method comprising:

providing a rotary screen adjacent said conveyor system having a plurality of openings therethrough defining at least one predetermined pattern;

delivering said hot-melt material to the interior of said rotary screen;

sensing when one of said packages or labels is about to pass adjacent said rotary screen;

indexing said rotary screen such that said at least one predetermined pattern is in register with said package or label;

moving said rotary screen into contact with said package or label;

simultaneously rotating said rotary screen at a predetermined speed relative to that of said package or label and forcing a desired amount of said hot-melt material through said at least one predetermined pattern onto said package or label;

moving said rotary screen out of contact with said package or label;

sensing a next subsequent package or label about to pass adjacent to said rotary screen; and

repeating said steps of indexing said rotary screen through said step of sensing a next subsequent package or label.

18. The method of claim 17 wherein said steps of delivering said hot-melt material through the step of repeating said steps are controlled and coordinated by a programmable logic controller.

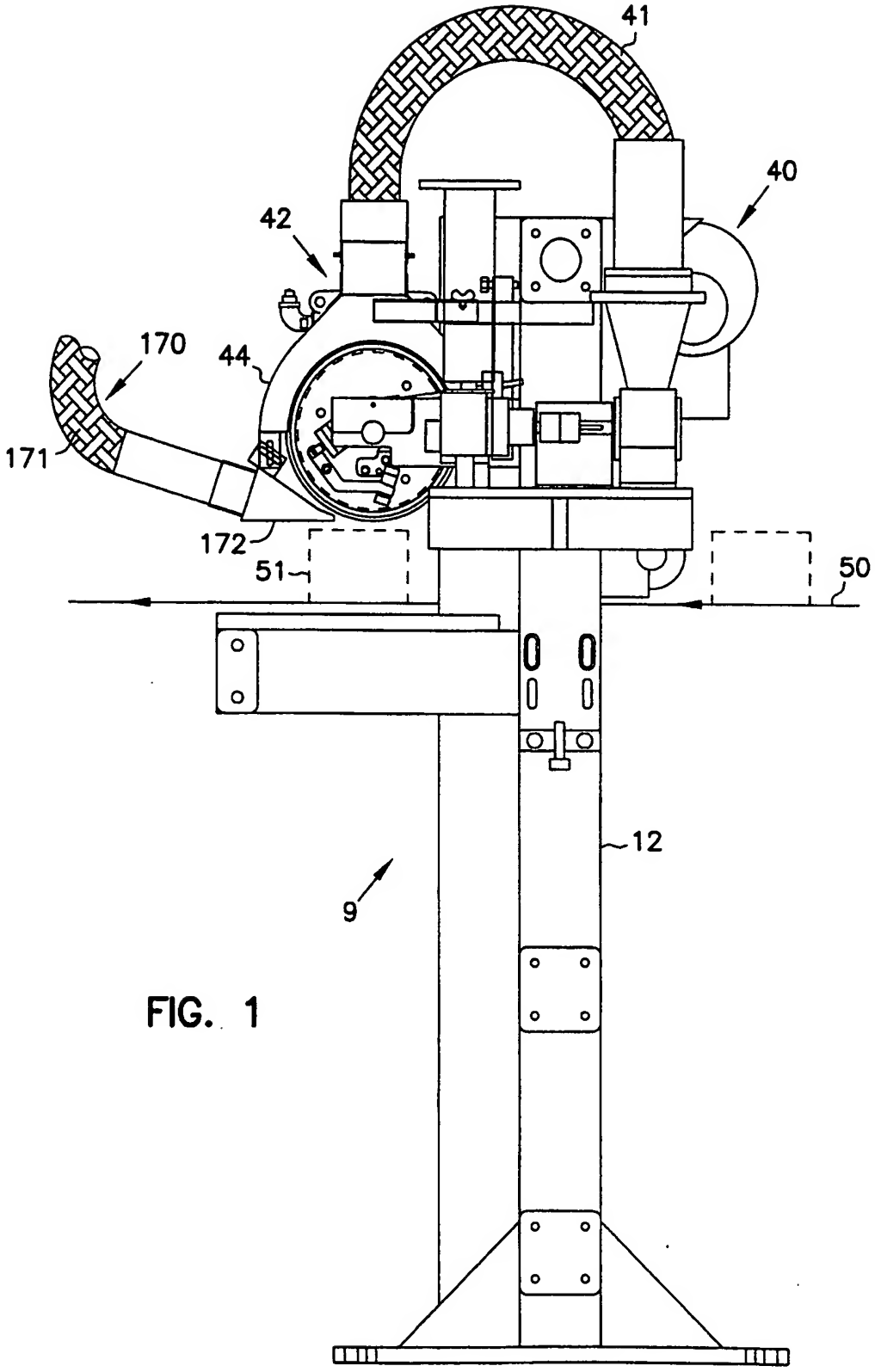

FIG. 1

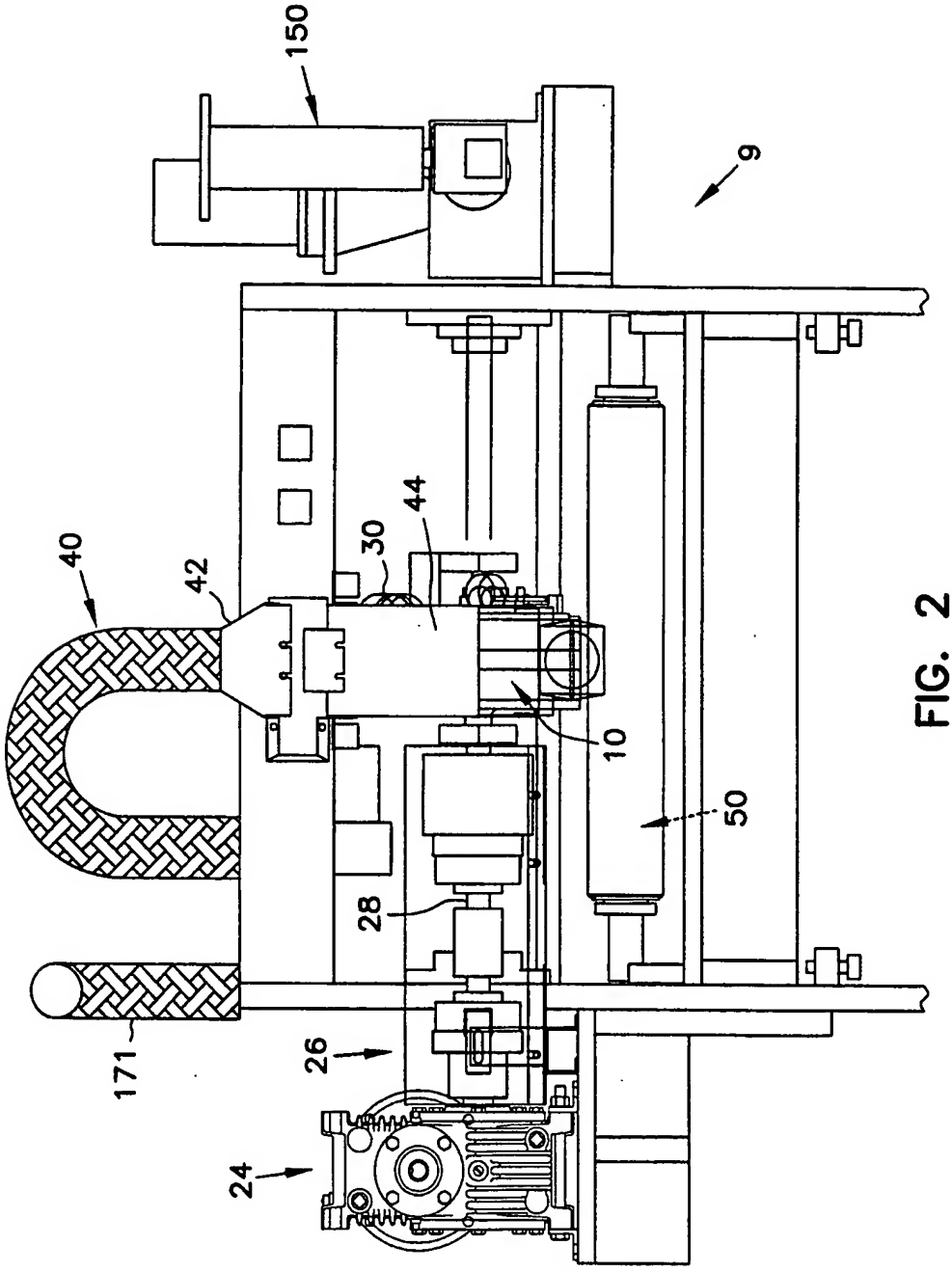

FIG. 2

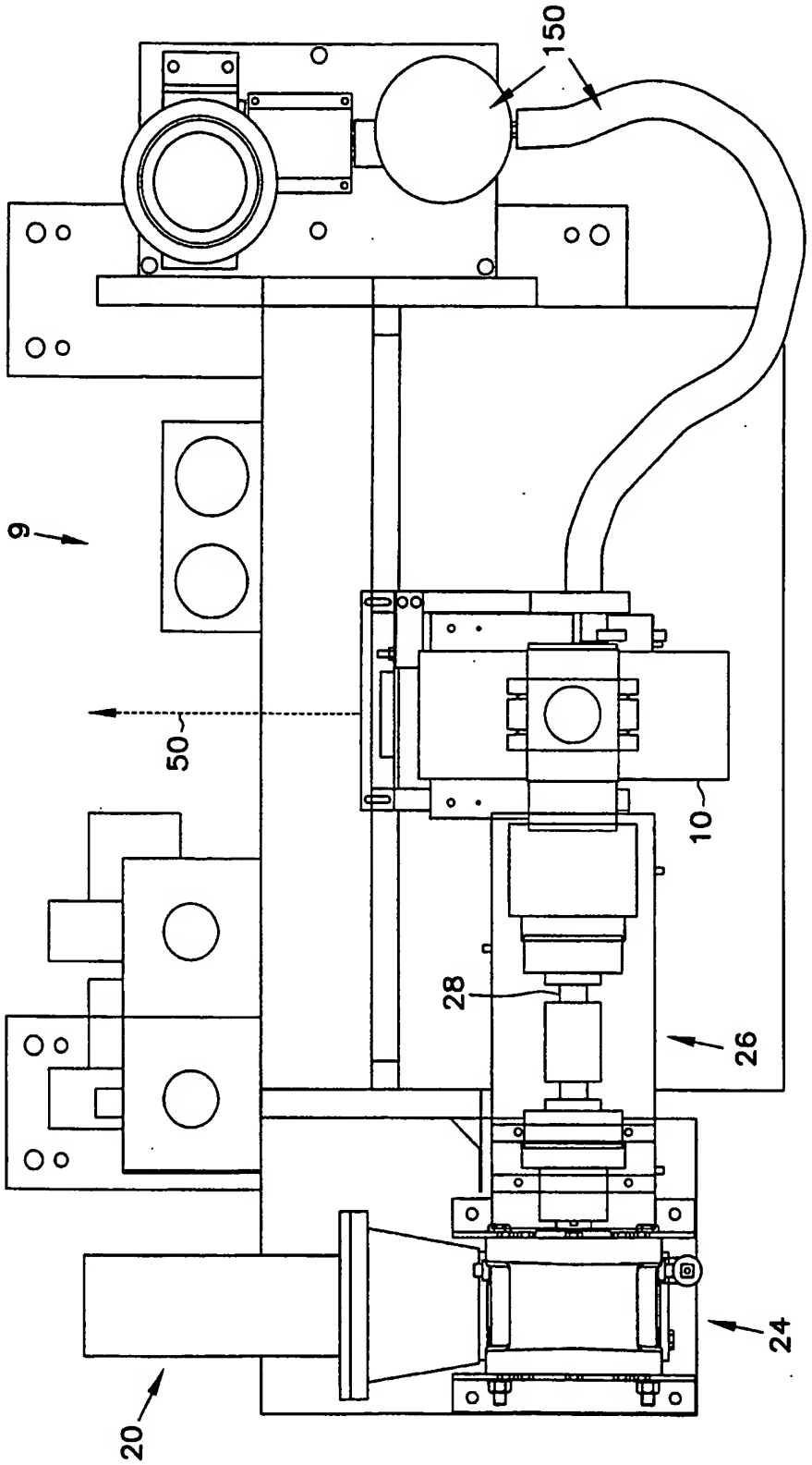

FIG. 3

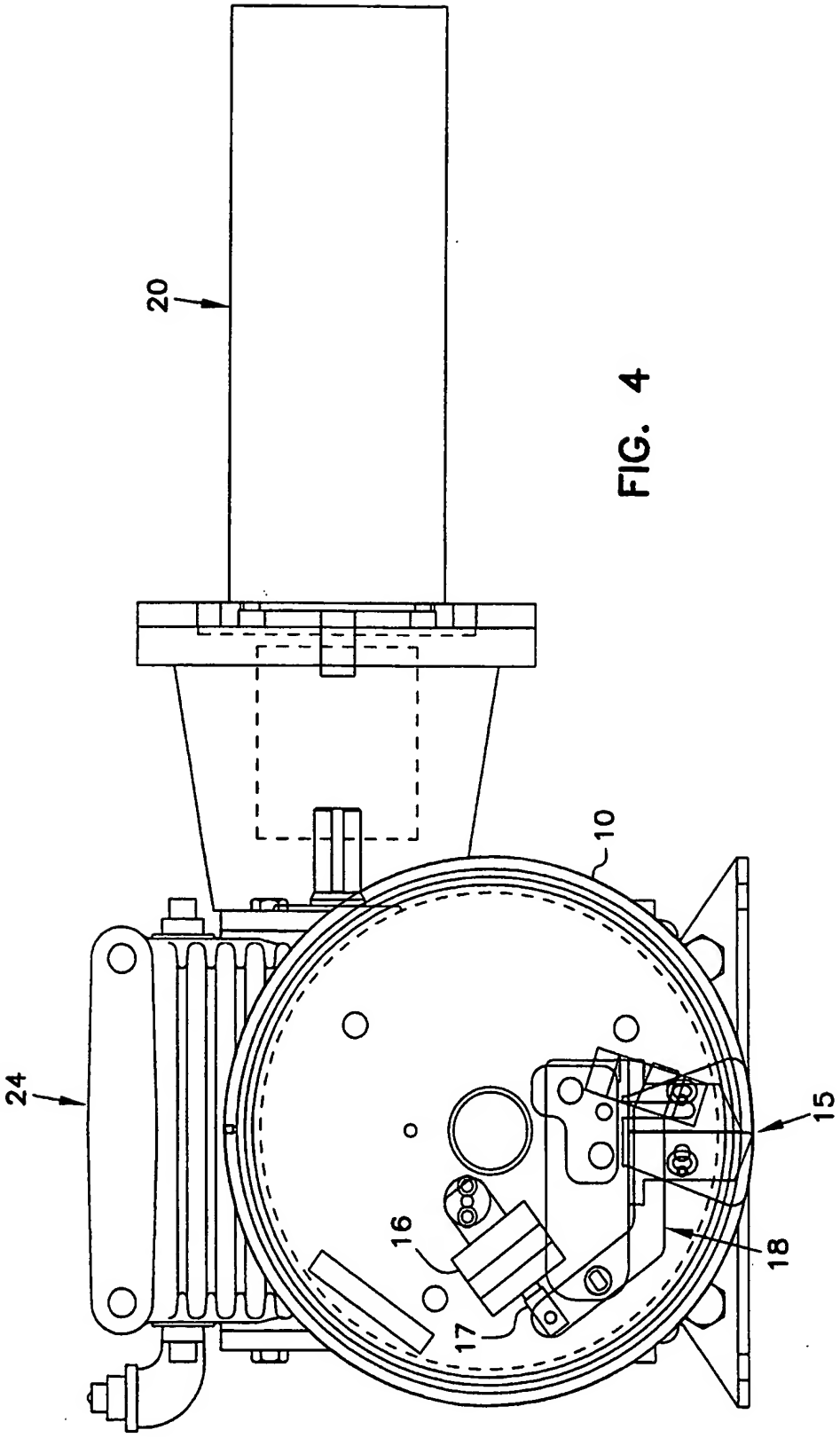

FIG. 4

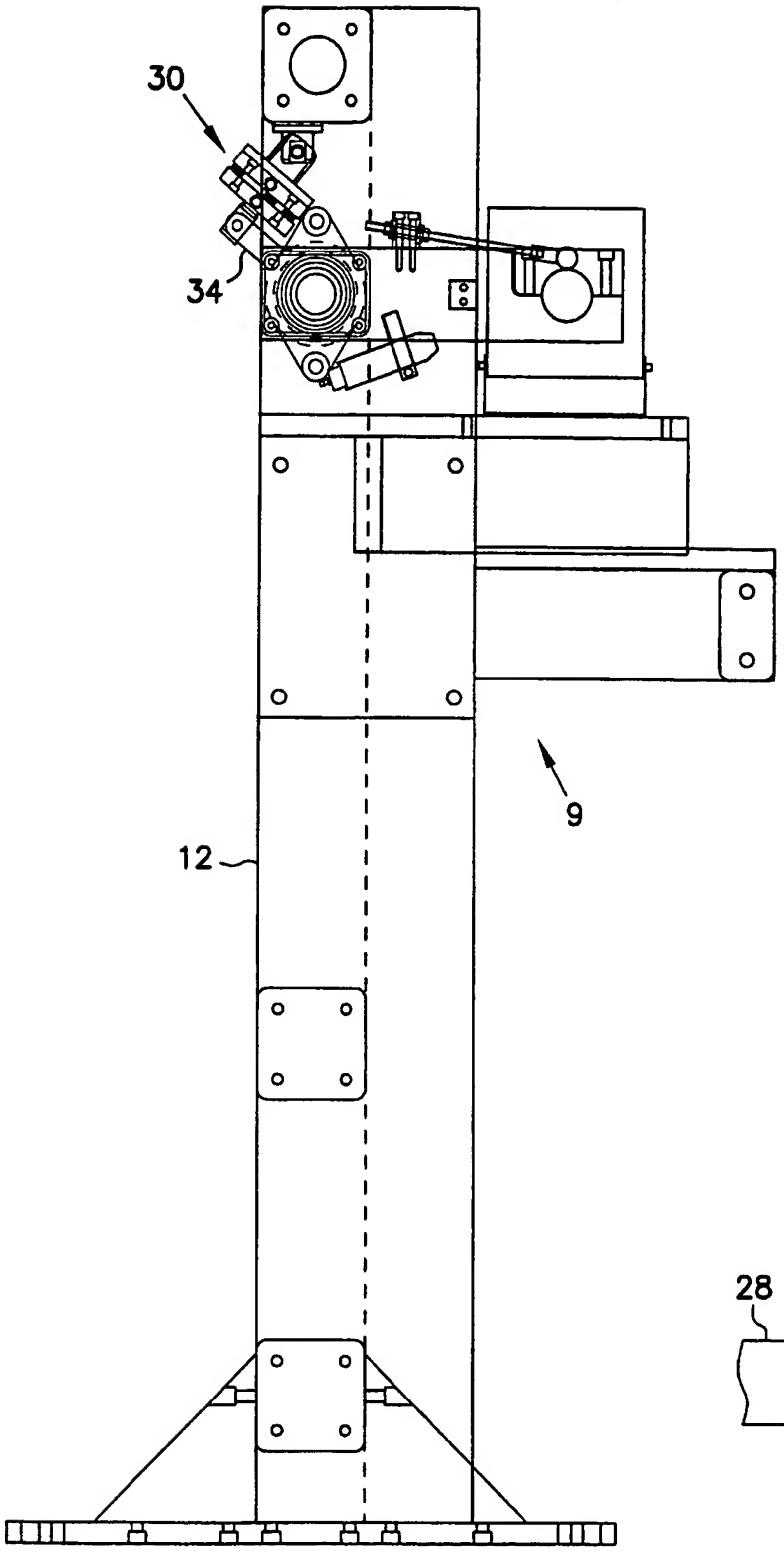

FIG. 5

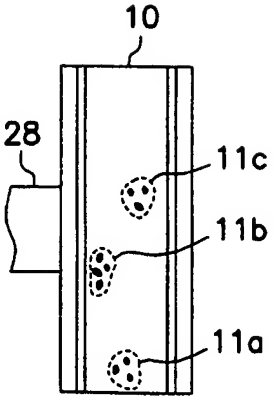

FIG. 6

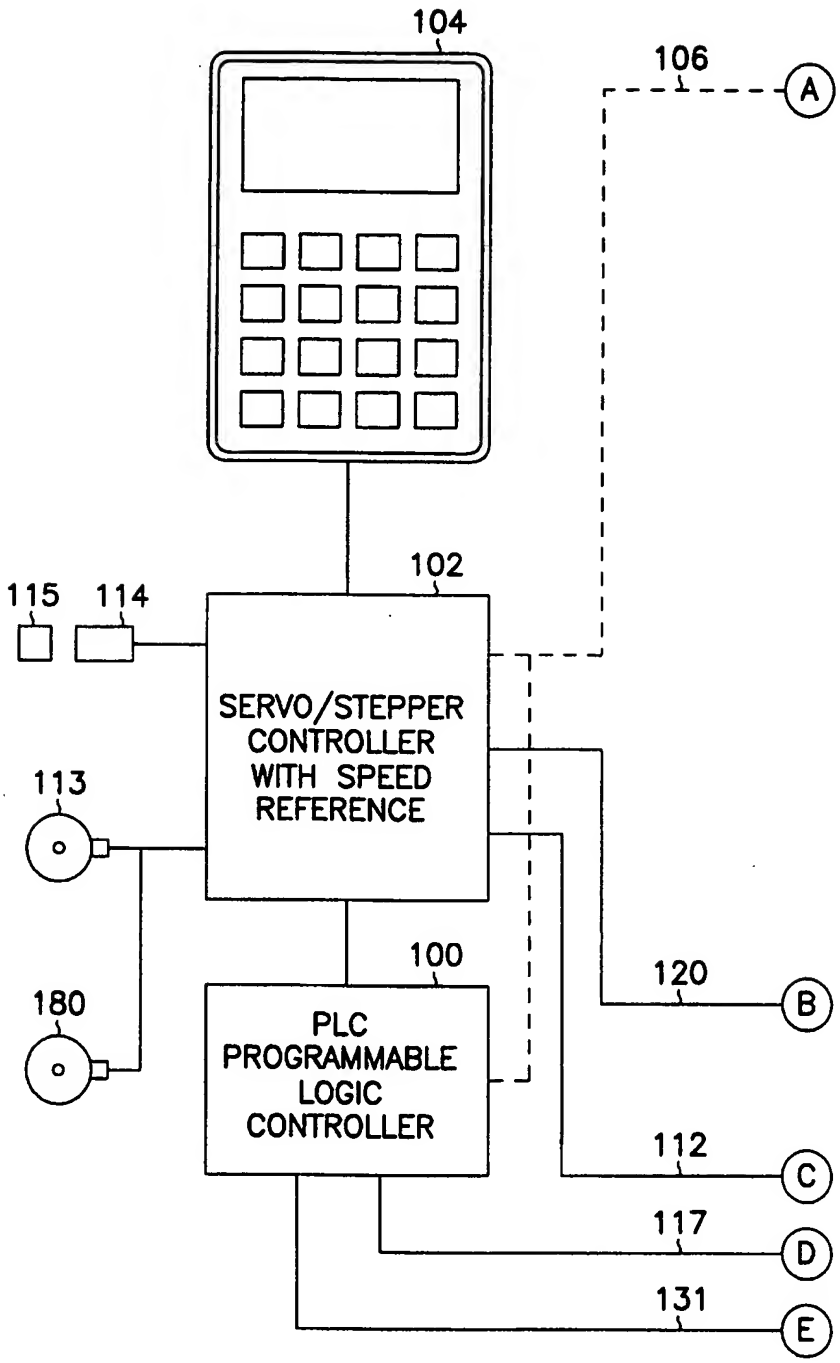
104
106
A
102
115
114
SERVO/STEPPER CONTROLLER WITH SPEED REFERENCE
113
180
100
PLC PROGRAMMABLE LOGIC CONTROLLER
120
B
112
C
117
D
131
E

FIG. 7

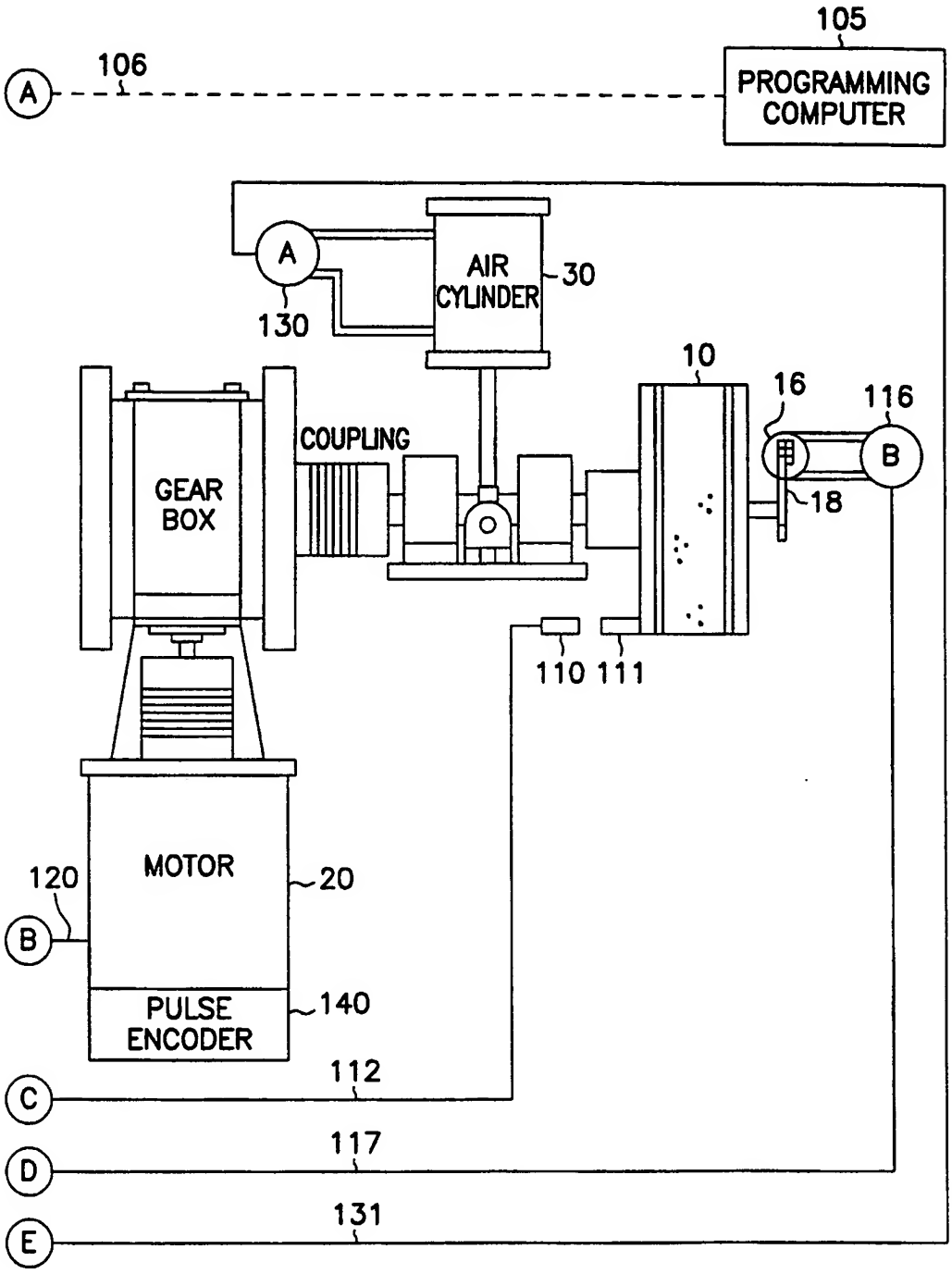
105
106
A
PROGRAMMING COMPUTER
A
130
AIR CYLINDER
30
10
16
116
B
COUPLING
GEAR BOX
18
110
111
MOTOR
120
20
B
PULSE ENCODER
140
112
C
117
D
131
E

FIG. 8

INTERNATIONAL SEARCH REPORT

Intern. ..nal application No.
PCT/US96/11890

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B41L 1/02, 3/02, 13/00, 13/04; B41F 5/16; B41M 1/12
US CL :101/116, 118-120, 129, 181, 183, 484-486
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 101/ 116, 118, 119, 120, 129, 181, 183, 484, 485, 486

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,247,882 A (ZOOK et al) 28 September 1993, entire document.	1-18
Y	US5,252,838 A (TIMBLIN) 12 October 1993, entire document.	1-18
Y	US 5,383,392 A (KOWALEWSKI ET AL.) 24 January 1995, entire document.	1-18
A	US 5,053,254 A (BILLETER) 01 October 1991.	1-18

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
18 OCTOBER 1996

Date of mailing of the international search report
31 OCT 1996

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Form PCT/ISA/210 (second sheet)(July 1992)*